WHAT IS CLAIMED IS:

1. A method for forming a radiation detector, comprising the steps of:

forming a radiation absorption layer above a substrate;

forming a wider bandgap layer above the radiation absorption layer;

forming a passivation layer above the wider bandgap layer;

forming a patterned doping layer above the passivation layer;

driving dopant from the patterned doping layer into the wider bandgap layer and the radiation absorption layer to form a doped region; and

forming an electrical contact to the doped region.

2. A method as in Claim 1 wherein the absorption layer includes HgCdTe.

3. A method as in Claim 1 wherein the absorption layer includes $Hg_{1-x}(Cd_{0.944}Zn_{0.056})_x Te$.

4. A method as in Claim 1 wherein the dopant is p-type.

5. A method as in Claim 1 wherein the dopant is arsenic.

6. A method for forming a radiation detector, comprising the steps of:

forming a radiation absorption layer above a substrate;

forming a wider bandgap layer above the radiation absorption layer;

forming a passivation layer above the wider bandgap layer;

forming a doping layer above the passivation layer;

wherein the absorption layer, the wider bandgap layer and the passivation layer are formed *in situ* by alternating layers of a first material and a second material, the composition of the absorption layer, the wider bandgap layer and the passivation layer being determined by the relative thicknesses of the layers of the first and second materials and, after deposition of the layers of first and second materials, annealing the first and second materials to produce an alloy of the first and second materials;

patterning the doping layer;

driving dopant from the patterned doping layer into the wider bandgap layer and the radiation absorption layer to form a doped region;

patterning the passivation layer to expose the doped region; and

forming an electrical contact to the doped region.

7. A method as in Claim 6 wherein the first material is HgTe and the second material is CdTe.

8. A method as in Claim 6 wherein the first material is HgTe and the second material is $Cd_{1-y}Zn_yTe$, where y is selected to provide a target lattice constant.

9. A method as in Claim 8 wherein y = 0.056.

10. A method as in Claim 6 wherein the absorption layer includes HgCdTe.

11. A method as in Claim 6 wherein the absorption layer includes $Hg_{1-x}(Cd_{0.944}Zn_{0.056})_x$ Te.

12. A method as in Claim 6 wherein the dopant is p-type.

13. A method as in Claim 6 wherein the dopant is Arsenic.

14. A radiation detector, comprising:

a substrate;

a radiation absorption layer above the substrate;

a wider bandgap layer above the radiation absorption layer;

a passivation layer above the wider bandgap layer;

a doped region extending through the passivation layer into the wider bandgap layer and the radiation absorption layer; and

an electrical contact to provide electrical contact to the doped region.

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15. A radiation detector as in Claim 14 wherein the absorption layer includes HgCdTe.

16. A radiation detector as in Claim 14 wherein the absorption layer includes $Hg_{1-x}(Cd_{0.944}Zn_{0.056})_x Te$.

17. A radiation detector as in Claim 14 wherein a dopant of the doped region is p-type.

18. A radiation detector as in Claim 14 wherein a dopant of the doped region is arsenic.

19. A radiation detector as in Claim 14 wherein the radiation absorption layer is adapted to detect infrared radiation.

20. A radiation detector formed by a method comprising the steps of:

forming a radiation absorption layer above a substrate;

forming a wider bandgap layer above the radiation absorption layer;

forming a passivation layer above the wider bandgap layer;

forming a doping layer above the passivation layer;

wherein the absorption layer, the wider bandgap layer and the passivation layer are formed *in situ* by alternating layers of a first material and a second material, the composition of the absorption layer, the wider bandgap layer and the passivation layer being determined by the relative thicknesses of the layers of the first and second material and, after deposition of layers of first and second material, annealing the first and second materials to produce an alloy of the first and second materials;

patterning the doping layer;

driving dopant from the patterned doping layer into the wider bandgap layer and the radiation absorption layer to form a doped region;

patterning the passivation layer to expose the doped region; and forming an electrical contact to the doped region.

21. A radiation detector as in Claim 20 wherein the first material is HgTe and the second material is CdTe.

22. A radiation detector as in Claim 20 wherein the first material is HgTe and the second material is $Cd_{1-y}Zn_yTe$, where y is selected to provide a target lattice constant.

23. A radiation detector as in Claim 22 wherein y = 0.056.

24. A radiation detector as in Claim 20 wherein the absorption layer includes HgCdTe.

25. A radiation detector as in Claim 20 wherein the absorption layer includes $Hg_{1-x}(Cd_{0.944}Zn_{0.056})_x Te$.

26. A radiation detector as in Claim 20 wherein the dopant is p-type.

27. A radiation detector as in Claim 20 wherein the dopant is Arsenic.

28. A method for forming a radiation detector, comprising the steps of:
forming a radiation absorption layer above a substrate;
forming a passivation layer above the radiation absorption layer;
forming a patterned doping layer above the passivation layer;
driving dopant from the patterned doping layer into the junction layer and the radiation absorption layer to form a doped region; and
forming an electrical contact to the doped region.

29. A method as in Claim 28 wherein the absorption layer includes HgCdTe.

30. A method as in Claim 28 wherein the absorption layer includes $Hg_{1-x}(Cd_{0.944}Zn_{0.056})_x Te$.

31. A method as in Claim 28 wherein the dopant is p-type.

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32. A method as in Claim 28 wherein the dopant is arsenic.

33. A method for forming a radiation detector, comprising the steps of:

forming a radiation absorption layer above a substrate;

forming a passivation layer above the radiation absorption layer;

forming a doping layer above the passivation layer;

wherein the absorption layer and the passivation layer are formed *in situ* by alternating layers of a first material and a second material, the composition of the absorption layer and the passivation layer being determined by the relative thicknesses of the layers of the first and second materials and, after deposition of the layers of first and second materials, annealing the first and second materials to produce an alloy of the first and second materials;

patterning the doping layer;

driving dopant from the patterned doping layer into the radiation absorption layer to form a doped region;

patterning the passivation layer to expose the doped region; and

forming an electrical contact to the doped region.

34. A method as in Claim 33 wherein the first material is HgTe and the second material is CdTe.

35. A method as in Claim 33 wherein the first material is HgTe and the second material is $Cd_{1-y}Zn_yTe$, where y is selected to provide a target lattice constant.

36. A method as in Claim 35 wherein y = 0.056.

37. A method as in Claim 33 wherein the absorption layer includes HgCdTe.

38. A method as in Claim 33 wherein the absorption layer includes $Hg_{1-x}(Cd_{0.944}Zn_{0.056})_x Te$.

39. A method as in Claim 33 wherein the dopant is p-type.

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40. A method as in Claim 33 wherein the dopant is Arsenic.

41. A radiation detector, comprising:

a substrate;

a radiation absorption layer above the substrate;

a passivation layer above the radiation absorption layer;

a doped region extending through the passivation layer into the radiation absorption layer; and

an electrical contact to provide electrical contact to the doped region.

42. A radiation detector as in Claim 41 wherein the absorption layer includes HgCdTe.

43. A radiation detector as in Claim 41 wherein the absorption layer includes $Hg_{1-x}(Cd_{0.944}Zn_{0.056})_x Te$.

44. A radiation detector as in Claim 41 wherein a dopant of the doped region is p-type.

45. A radiation detector as in Claim 41 wherein a dopant of the doped region is arsenic.

46. A radiation detector as in Claim 41 wherein the radiation absorption layer is adapted to detect infrared radiation.

47. A radiation detector formed by a method comprising the steps of:

forming a radiation absorption layer above a substrate;

forming a passivation layer above the radiation absorption layer;

forming a doping layer above the passivation layer;

wherein the absorption layer and the passivation layer are formed *in situ* by alternating layers of a first material and a second material, the composition of the absorption layer and the passivation layer being determined by the relative thicknesses of

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the layers of the first and second material and, after deposition of layers of first and second material, annealing the first and second materials to produce an alloy of the first and second materials;

patterning the doping layer;

driving dopant from the patterned doping layer into the radiation absorption layer to form a doped region;

patterning the passivation layer to expose the doped region; and forming an electrical contact to the doped region.

48. A radiation detector as in Claim 47 wherein the first material is HgTe and the second material is CdTe.

49. A radiation detector as in Claim 47 wherein the first material is HgTe and the second material is $Cd_{1-y}Zn_yTe$, where y is selected to provide a target lattice constant.

50. A radiation detector as in Claim 49 wherein y = 0.056.

51. A radiation detector as in Claim 47 wherein the absorption layer includes HgCdTe.

52. A radiation detector as in Claim 47 wherein the absorption layer includes $Hg_{1-x}(Cd_{0.944}Zn_{0.056})_x$ Te

53. A radiation detector as in Claim 47 wherein the dopant is p-type.

54. A radiation detector as in Claim 47 wherein the dopant is Arsenic.

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